



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/633,886	08/04/2003	Charles H. Dennison	ITO.0544US (P15589)	5250

7590 04/13/2005  
TROP, PRUNER & HU, P.C.  
STE 100  
8554 KATY FWY  
HOUSTON, TX 77024-1841

EXAMINER

LOKE, STEVEN HO YIN

ART UNIT	PAPER NUMBER
----------	--------------

2811

DATE MAILED: 04/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/633,886

Applicant(s)

DENNISON, CHARLES H.

Examiner

Steven Loke

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-21,23,24 and 26-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,3 and 7-10 is/are allowed.
- 6) ☒ Claim(s) 4-6,11-21,23,24 and 26-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/21/05</u> . | 6) <input type="checkbox"/> Other: _____  |

1. Claims 19, 20 and 29 are objected to because of the following informalities:

Claim 19, line 2, the phrase "said grooves" has no antecedent basis. Claim 20, line 1, the phrase "said grooves" has no antecedent basis. Claim 29, line 1, the phrase "said damascene via" has no antecedent basis. Appropriate correction is required.

2. Claims 4-6, 11-20, 23, 24 and 26-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4, lines 1-2, the phrase "forming a pore over a substrate" is vague and indefinite. It is unclear where is the pore being formed relative to the phase change memory and the substrate. It is also unclear where is the substrate being formed relative to the phase change memory.

Claim 4, lines 2-3, the phrase "said pore having a dimension smaller than the feature size possible with lithographic techniques" is unclear as to what is the dimension smaller than the feature size possible with lithographic techniques. Is there a limit in the dimension?

Claim 11, lines 1-2, the phrase "forming a plurality of memory cells as a plurality of integrated islands spaced from one another" is vague and indefinite. It is unclear how the memory cells related to the phase change memory in claim 1. Is each of the plurality of memory cells made of a phase change memory of claim 1? If so, it is unclear whether the phase change memory formed in each of the plurality of islands.

Claim 15, lines 1-2, the phrase "forming a vertical groove in a memory array and a periphery" is vague and indefinite. It is unclear how the memory array related to the

memory cells of claim 11 and the phase change memory of claim 1. It is also unclear whether the periphery is referred to the periphery of the memory array. It is also unclear whether a vertical groove is also formed in the periphery of the phase change memories.

Fig. 14 discloses forming a vertical groove [53] through the insulator [44] in the phase change memory and forming a vertical groove [55] through the insulator [44] in the periphery of the phase change memory. It also discloses the groove [55] is not filled with sacrificial light absorbing material [47]. The groove [53] and the groove [55] have the same depth. However, it is unclear why claim 16 discloses filling said groove in said periphery with a sacrificial light absorbing material. It is also unclear why claim 17 further discloses etching said groove in said periphery into said sacrificial light absorbing material. It is unclear why claim 19 discloses forming said groove in said periphery deeper than said grooves in the memory array.

Since claim 21 discloses an apparatus comprising a phase change memory, a conductive line and a via, its dependent claims should depend to the apparatus of claim 21. It is unclear why claims 23-29 depend upon a memory. It is believed that the dependent claims 23-29 depend upon the apparatus of claim 21.

It is unclear where is the substrate of claim 24 being formed relative to the phase change memory in claim 21.

Claim 24, lines 1-2, the phrase "a pore over a substrate" is vague and indefinite. It is unclear where is the pore being formed relative to the substrate and the phase change memory.

Claim 24, lines 2-3, the phrase "said pore having a dimension smaller than the feature size possible with lithographic techniques" is unclear as to what is the dimension smaller than the feature size possible with lithographic techniques. Is there a limit in the dimension?

Claim 28, line 2, the phrase "a vertical extent at least twice its horizontal extent" is vague and indefinite. It is unclear whether a vertical length of the upper electrode is at least twice a horizontal length of the upper electrode.

It is unclear where is the damascene via of claim 29 being formed in the apparatus of claim 21.

It is also unclear where is the insulator of claim 29 being formed in the apparatus of claim 21.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 21 and 27 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Technische Hochschule Karl-Marx-Stadt (DD 251 225 A1 in the IDS filed on 1/21/05).

In regards to claim 21, Technische Hochschule Karl-Marx-Stadt shows all the elements of claimed invention in figs. 1 and 2. It is an apparatus, comprising: a phase change memory [9, 10] including a phase change storage element [9, (5, 7, 8)] and a phase change threshold switch [10, (2, 4, 5)]; a conductive line [2] coupled to said

Art Unit: 2811

phase change storage element [9] and said phase change threshold switch [10]; and a via (an area where layer [4] extends through the silicon dioxide layer [3]) to said conductive line [2].

In regards to claim 27, Technische Hochschule Karl-Marx-Stadt further discloses a barrier layer [6] between the threshold switch [10, (a portion of layer [5] under layer [6], 2, 4)] and the storage element [9, (a portion of layer [5] not under layer [6], 7, 8)].

5. Claims 1, 3 and 7-10 are allowed.

6. Claim 23 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter: The additional major difference in the claims not found in the prior art of record is the switch is formed over said element.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Loke whose telephone number is (571) 272-1657. The examiner can normally be reached on 8:20 am to 5:50 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2811

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sl  
April 9, 2005

Steven Loke  
Primary Examiner

A handwritten signature in cursive script that reads "Steven Loke".